

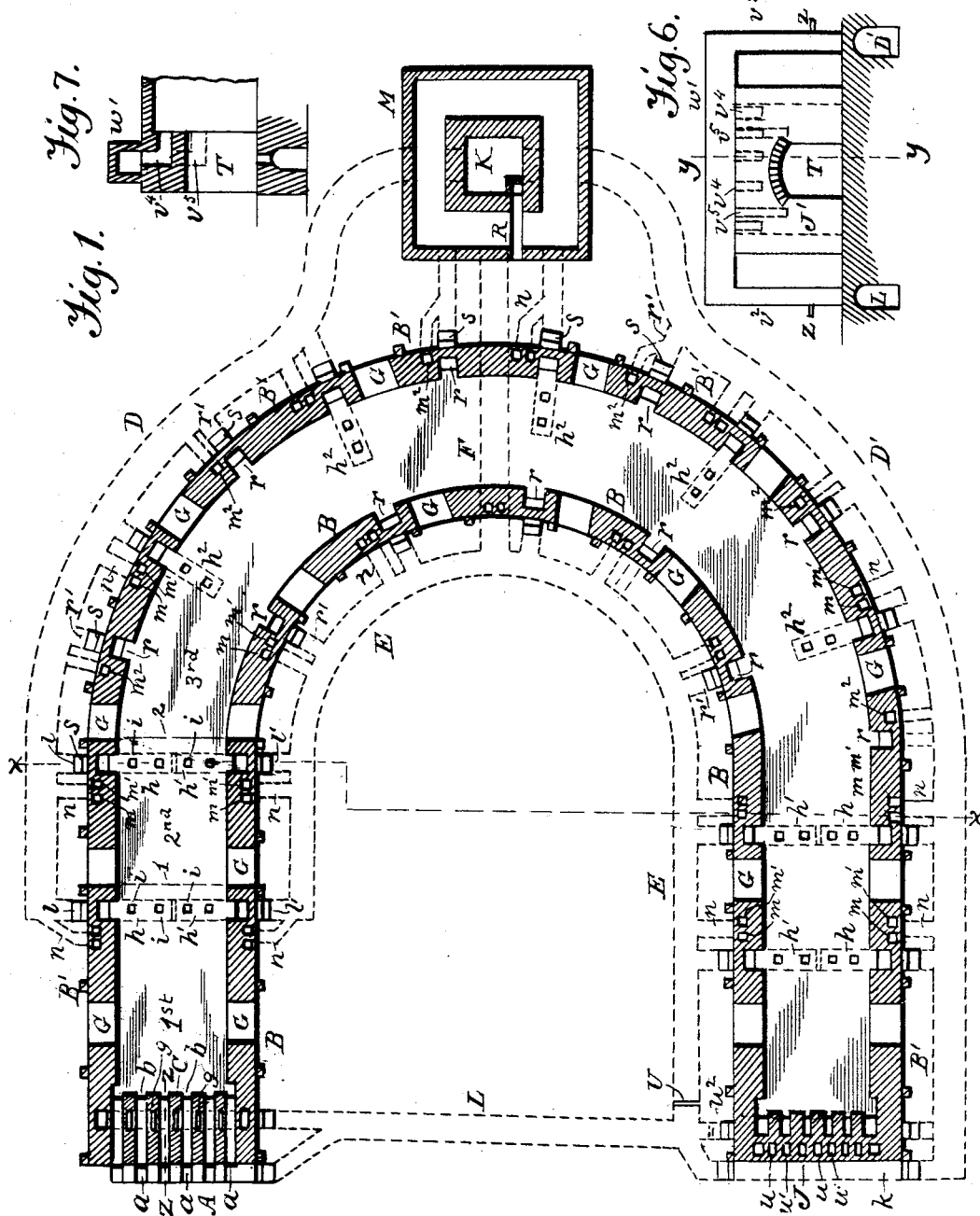
(No Model.)

2 Sheets—Sheet 1.

C. F. KAUL.  
BRICK KILN.

No. 524,442.

Patented Aug. 14, 1894.



*Witnesses.*  
*A. Ruppert.*  
*H. A. Daniels*

*Inventor.*  
*Carl F. Kaul*  
*By Thomas P. Simpson*  
*Attorney*

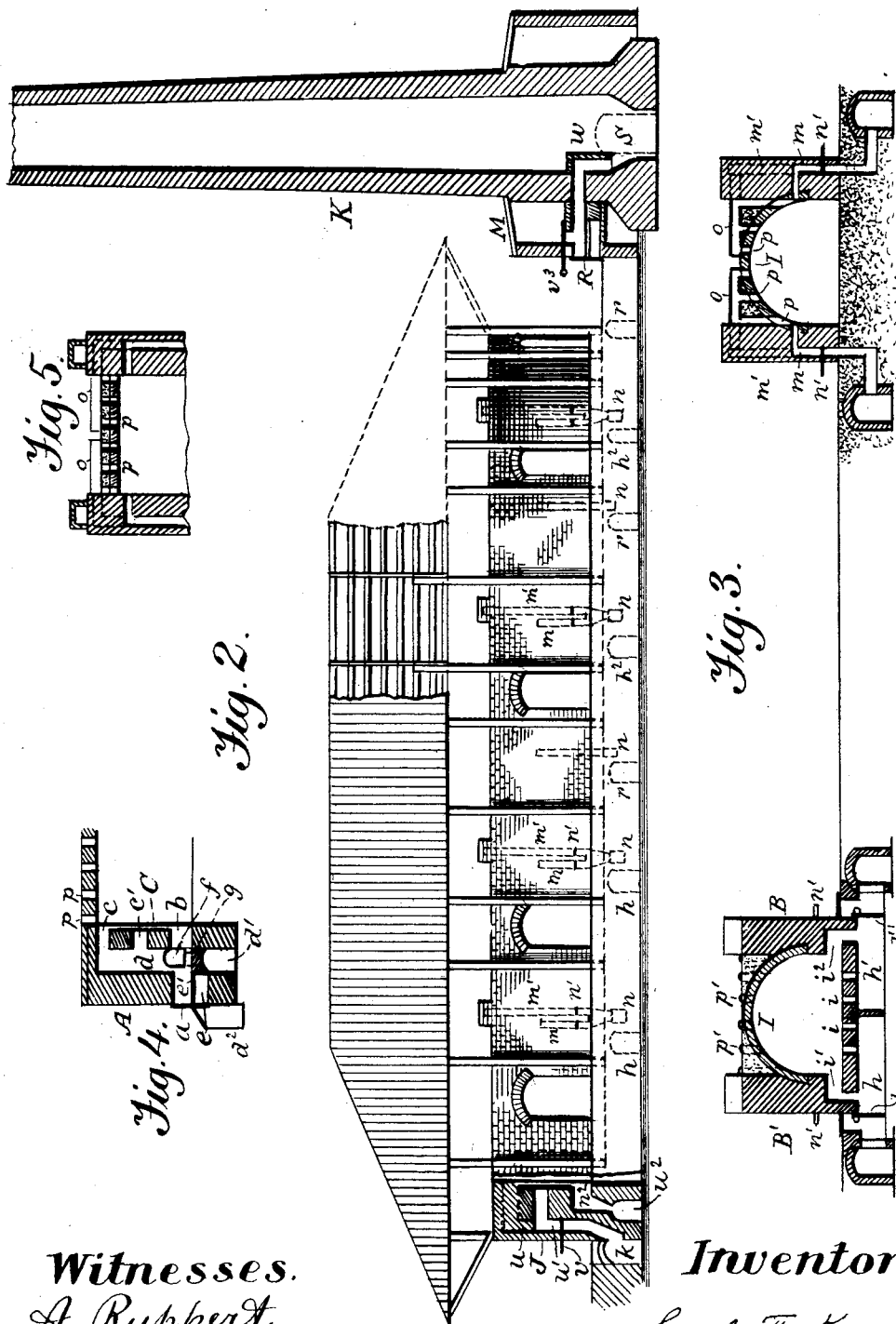
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# UNITED STATES PATENT OFFICE.

CARL F. KAUL, OF MADISON, NEBRASKA.

## BRICK-KILN.

SPECIFICATION forming part of Letters Patent No. 524,442, dated August 14, 1894.

Application filed March 10, 1894. Serial No. 503,164. (No model.)

*To all whom it may concern:*

Be it known that I, CARL F. KAUL, a citizen of the United States, residing at Madison, in the county of Madison and State of Nebraska, have invented certain new and useful Improvements in Brick-Kilns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to brick kilns and consists in certain improvements in the construction of certain kilns described in certain Letters Patent formerly issued to me and numbered 486,972 and 507,274 respectively.

In the accompanying drawings Figure 1 represents a plan, sectional view of a kiln having my improvements, the section being taken just above the floor of the kiln. Fig. 2 is a sectional side view of the kiln. Fig. 3 is a transverse section taken on line  $x-x$  of Fig. 1. Fig. 4 is a vertical section taken on line  $z-z$  of Fig. 1. Fig. 5 shows a modification in the construction of the upper part of the kiln. Fig. 6 shows a modification in the construction of the rear end of the kiln. Fig. 7 is a vertical section taken on the line  $y-y$  of Fig. 6.

The kiln building may be constructed partly on a curve and partly on parallel lines as shown in Fig. 1, the front wall A, being at one end of the structure and the side walls B, B', extending to the rear end of the kiln. The brick compartment is continuous and extends between the walls B, B' from one end of the kiln to the other, doors G being placed at intervals for access to the interior. Two main, underground flues D, D' extend along the walls B, B' and connect with the chamber M which is built around the smoke stack K. Another main, underground flue E extends along the inner wall B, and is connected with the chamber M by an underground flue F.

The front wall A of the kiln has a number of furnaces  $a$  therein, and an inner wall C, in rear of wall A, has openings  $b$  therein, which are on lines with furnaces  $a$ , for the passage of fire from said furnaces to the interior of the kiln. Vertical flues  $d$  are formed between the front and inner walls A and C, said flues extending upward and being connected with the interior of the kiln by openings  $c, c'$ , in

the wall C. Ash-pits  $e$  are located under the furnace grates  $e'$ . The vertical flues  $d$  are connected laterally by apertures  $f$ , which are somewhat above the plane of the furnace grates and short passages  $g$  are made in the division walls of flues  $d$ , and extend down from apertures  $f$ , to an underground flue  $d'$ , which extends across under the kiln. The short passages  $g$ , between flues  $d$ , and apertures  $f$ , laterally connecting flues  $d$ , serve to prevent the coal cinders and gases from accumulating in the flue  $d'$  below, and also serve to keep the flue  $d'$  clear for a free passage from the rear end of the kiln to the front end.

Underground flues  $h, h'$ , extend under the floor of the kiln and about half way across from opposite sides and are connected with the interior severally by apertures  $i$  in the floor. Each flue  $h$  is in line with a flue  $h'$ , and two flues,  $v'$  and  $v''$ , in the walls of the kiln connect said flues  $h, h'$  with the interior. The flues  $h, h'$  extend outward and connect with main underground flues. Slide dampers  $l, l'$ , in flues  $h, h'$ , are for regulating the draft from the interior through said flues to main, underground flues.

Vertical flues  $m, m'$ , adjacent one to the other, are formed in or built outside of the opposite walls at intervals, both of said flues being connected at their lower ends with one of the main underground flues by branch flues  $n$ . The flues  $m, m'$  extend upward and are then turned inward, so that the flue  $m$  connects with the interior of the kiln at a point about half way from the floor to the top of the kiln, and the flue  $m'$  connects with a horizontal flue  $o$  on the top of the kiln and extending about one half of the distance across the top—see Fig. 3.

Dampers  $n'$  are provided for flues  $m, m'$ . Flues  $m^2$  are similar to flues  $m$ , and are connected in like manner with underground flues.

The flues  $o$  which extend from opposite side walls nearly to the center line of the top of the kiln are removable and are connected with the interior of the kiln by small flues  $p$ . The top covering of the kiln may be in the form of an arch I having perforations in which thimbles are set to form small flues  $p$ , a filling of earth or other suitable material being placed about the thimbles so as to form a

level surface at the top; or the top may be constructed, as seen in Fig. 5, with upper and lower straight surfaces. The flues *o*, in position extend from flues *m'* on opposite sides of the kiln nearly to the center line of the top so that each flue *o* covers one half of a row of apertures *p*, so that drafts are formed from opposite parts of the interior through the top, then to opposite flues *m'* and downward to opposite, main underground flues.

During the continuous drying, burning and cooling in the kiln, the flues *o* are moved rearward from time to time, and placed in connection with two opposite flues *m'* and with small flues *p* of another section of the kiln; and when flues *o* are removed from one set of flues *p*, the latter may be closed by means of covers *p'*, as seen in Fig. 3.

As will be seen, the underground flues *h*, *h'*, extending in opposite directions from about or near the center line of the kiln, with apertures *i* in the floor, connecting the flues *h*, *h'*, severally with opposite parts of the interior, form downward and outward drafts from the interior of the kiln to main, underground flues one of which is on either side of the kiln and leads to the smoke stack. The flues *m*, *m'*, in opposite walls B, B', are also independent flues, the flues *m* forming lateral drafts in opposite directions from the interior and downward to different main underground flues, one of which is on either side of the kiln, and the flues *m'* forming upward drafts through flues *p* in the top of the kiln and through flues *o* and downward through flues *m'* to opposite, main underground flues.

Flues *h<sup>2</sup>* are located along the curved portion of the wall B' and extend under the floor of the kiln about or nearly to the center line of the kiln floor and are connected with the interior of the kiln and with underground flues, by constructions similar to those of flues *h*. Flues *r* located at intervals along both walls of the kiln connect the interior with main, underground flues by branch flues *r'*. Dampers are provided for branch flues *r* as seen at *s*.

J indicates the rear wall of the kiln, said wall being shown in vertical section in Fig. 2. The rear wall is provided with vertical flues *u*, *u'*, which connect at their lower ends with an underground flue *k* along said rear wall. The flues *u* extend nearly to the top of the wall and are then turned to and connect with the interior, and flues *u'* extend about halfway to the top and are then turned to and connect with the interior as shown in Fig. 2. The flues *u*, *u'* are provided with dampers *v* for regulating draft through said flues.

In the rear wall J is a series of passages from an underground flue *u<sup>2</sup>* to the interior of the kiln, said flue *u<sup>2</sup>* extending across the kiln and connecting with flues D' and E and also with flue L which is an underground flue which extends across from the rear part of the kiln to the front part. The flue *k* connects at one end with the flue D' and at the oppo-

site end with flues E and L, so that the operation may be continued from the rear end of the kiln to the front end.

K indicates the smoke-stack around which, at the base, is built a chamber M, in which is placed a furnace R which communicates with the flue of the stack by a downward flue *w* within the stack. Flue openings S are made in opposite sides of the stack at its base for the draft to enter from the chamber M. An opening in the top of the furnace R is provided with a damper *v<sup>3</sup>*.

In Fig. 6 is shown in elevation, and in Fig. 7 in vertical section, a modification in the construction of the rear part of the kiln, a door T being made in the center of the rear wall, and a stationary flue *w'* being located on and along the top of said wall and connected with vertical side flues *v<sup>2</sup>* which are provided with dampers *z*. One of said flues *v<sup>2</sup>*, connects flue *w'*, with underground flue D' and the other flue *v<sup>2</sup>* connects flue *w'* with underground flues E and L. A damper U in flue E, near the rear end of the kiln, is closed when the connection is made between the rear and the front end of the kiln through the flue L. Short vertical flues *v<sup>4</sup>*, and *v<sup>5</sup>* are made in the rear wall J' and connect the interior of the kiln with the flue *w'* on the top of the wall. Thus an upward draft is formed through flues *v<sup>4</sup>* and *v<sup>5</sup>* to flue *w'*, and from thence downward through the side flues *v<sup>2</sup>*, to the flues E and L, and to flue D'.

The door T is intended for taking brick into the kiln at its rear end, this being done usually by cars. Often the brick are dried in car-driers, said brick being loaded on cars which are run into the drier; and the door T is provided at the rear end of the kiln to admit the loaded cars for such purpose and also for burning.

In operation, the kiln may be used by sections continuously, one or more sections being first charged with green brick and separated by temporary partitions as indicated at 1 and 2 in Fig. 1; vertical openings are left in the mass of brick in each section, such openings extending from top to bottom, said openings being directly under the flues *p* in the top of the kiln and spaced equally both longitudinally and cross-wise of the kiln.

Suppose the first and second sections to be charged with green brick on beginning operation; the doors to those sections of the kiln are closed and the dampers, *l*, *l'*, of flues *h*, *h'*, communicating with the interior of said two sections, are opened; the caps or covers are removed from a line of flues *p* which are in line with two flues *m'* of the kiln and two removable flues *o*, are placed in connection with two opposite flues *m'* and with the line of flues *p*, the caps having been removed from the latter, so that each flue *o* is in connection with one half of the flues *p* in the row; the dampers in flues *m'*, are then opened. Passages being thus opened from the first and second sections of the kiln to the smoke-

stack, the fire is then started; the fire and draft from furnaces *a*, pass rearward through openings *b*, flues *d*, and openings *c* and *c'* to the interior of the kiln, going through the mass of green brick therein, and through the floor to flues *h*, *h'*, and from thence to the main, underground flues and to the smoke stack. Meanwhile the third section of the kiln is being filled with green brick, in like manner with section two, and a temporary partition is placed in rear of section three; two flues *o*, are placed over another row of flues *p*, in the top and farther rearward, the caps being removed as before; the dampers *l* and *l'*, of section three, and the damper *s* of flue *r*, section three, is opened, as are also the dampers of flues *m*, *m'* and *m''* of said section. Meantime the firing in the first and second sections having proceeded, the brick in the former being red hot and in the latter nearly dry, fuel is fed to the first section through the flues *p* in the top of the kiln; the fourth section is then filled with green brick and the operation is continued as before.

I claim—

1. In a continuous kiln, main underground flues, at and along the opposite sides of the kiln, branch flues connecting said main flues severally and independently with the interior of the kiln from opposite sides thereof, and a smoke-stack, to which said main flues lead and with which they are severally connected, substantially as set forth and described.

2. The combination with the front wall of a kiln, provided with a series of furnaces, of an inner wall, provided with openings in lines

with said furnaces, vertical flues formed between said front and inner walls, said vertical flues being connected laterally by apertures above the plane of the furnace grates, short flues or passages which extend downward from said apertures to an underground flue below, substantially as set forth and described.

3. In a kiln, the combination with main underground flues, extending along opposite sides of the kiln and having connections with a smoke-stack, of a series of vertical flues, placed at intervals along the opposite walls and connected at their lower ends with said main flues, some of said vertical flues having connection with the interior through the top of the kiln and others through the side walls, the vertical flues on each side connecting with the interior of the kiln independently and with opposite parts of the interior, substantially as set forth and described.

4. The combination with the rear wall of a kiln, of a horizontal flue on the top of said wall, vertical flues in said rear wall, connecting with said horizontal flue and with the interior of the kiln, a vertical flue, on each side of the kiln, connecting with said horizontal flue and extending down to and connecting with underground flues running to a smoke-stack, substantially as set forth and described.

In testimony whereof I have affixed my signature in presence of two witnesses.

CARL F. KAUL.

Witnesses:

D. G. STUART,  
A. RUPPERT.